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# Center for Risk Excellence Interns 2000

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## Summary Report of Interns and their Research

August 2000

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### Center for Risk Excellence



## INTRODUCTION

For the past three years, the Center for Risk Excellence (CRE) and its National Laboratory and University partners have championed an internship program aimed at providing young people an opportunity to work closely with the U.S. Department of Energy (DOE) in the environmental arena. The 30 participating students have represented a diverse background (Hispanic American, Pacific-Asian American, Native American, African American and European American) and have included undergraduate, bachelor, master, and doctoral candidates. Their involvement in DOE projects offers them hands-on experience and often provides us a fresh perspective.

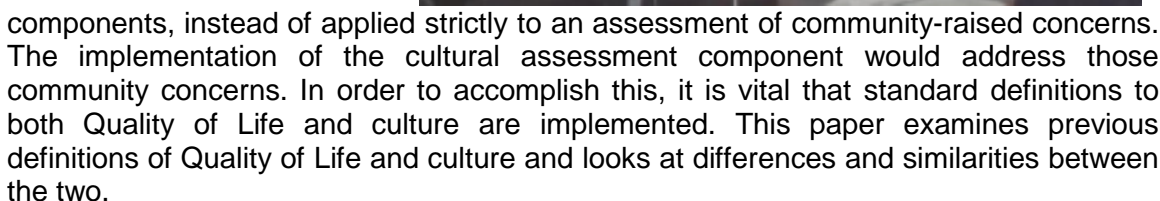
I believe that the long-term impact of this program to DOE will be significant. The interns extend DOE's arm by attending professional meetings, through their publications, and in their academic work. Some of the participants are preparing to present or publish their summer's work at national meetings or in journals. Many students have gone on to continue their formal education at institutions such as Stanford, Northwestern, Marquette, and the University of Chicago. Others are now teaching in environmental programs. One intern focused his graduate research on a topic important to DOE Environmental Management (risk assessment of chemical mixtures).

We have been very fortunate to work with such fine young adults - our stewards of the future. I invite you to meet the outstanding group of summer interns for the year 2000.

Alvin L.Young, Ph.D.  
Director, Center for Risk Excellence

### ***Quality of Life***

The intent of Pete's work is to show that the community concerns addressed in a Quality of Life assessment are, in fact, cultural concerns specific to the culture of that community and not solely dependent upon ethnicity. Quality of Life should be used to reference the scope of the entire risk assessment, which would include human health, ecological, economic and cultural assessment




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*Materials, the Center for Risk Excellence, and the International Institute for Indigenous Resource Management that will take place in September.*

**Larry Lapachin, International Institute for Indigenous Resource Management**

## ***Taxonomy of Community Risk***

Risk assessment has focused traditionally on the probability of adverse human and ecological health risk caused by ecological stressors. Although this method allows risk assessors to quantify and justify environmental risks during the decision-making process, the community's overall Quality of Life may not be considered. Because communities are complex and have unique societal, cultural, environmental, health, and other quality of life concerns, a more holistic and environmentally sound method to assess a development and/or cleanup must be established.

A portrait of a man with glasses and a checkered shirt, smiling. He is identified as Larry's in the text.

Larry's work explores the creation of taxonomy of community risk variables to address Quality of Life concerns. This taxonomy will outline the risk, characteristics, consequence(s)/rationale, and data measure pertaining to the risk factor. The taxonomy is also a major component of the "No Net Risk Gain Model". This model ensures the environmental justness of a proposed development and/or cleanup, which can be achieved only if it eliminates or decreases existing risk or introduces or increases benefits for a community. The taxonomy is designed to assist and equip tribes, communities, urban and rural residents, developers, and other stakeholders with a community risk assessment tool that identifies and inventories the risk burdens in their neighborhoods.

*Larry Lapachin, a graduate student from Miami University of Ohio, is interning with the International Institute for Indigenous Resource Management in Denver, Colorado this summer. The Environmental Careers Federal Facility Restoration and Reuse of the U.S. Environmental Protection Agency and the Department of Energy's Center for Risk Excellence support his 4-month internship. Larry is pursuing a master's degree in Environmental Science with a concentration in Urban and Regional Analysis. Before joining the Institute, Larry interned at the City of Hamilton, Ohio, Department of Economic Development, where he co-authored a Brownfield Job Training Grant application that was funded by EPA in May this year. Mr. Lapachin received his B.S. degree in Social Work from the University of Wisconsin-Superior in May 1996. He was then an AmeriCorps volunteer in St. Paul, MN, serving as a tutor and an employment counselor for recent immigrants and refugees. Larry is working with Institute staff and associates on a "No Net Risk Gain Model" for assessing the environmental justice of proposed Brownfield redevelopment and federal facility cleanup*



**Stephanie Brown, Medical University of South Carolina**

The Environmental Biosciences Program (EBP) is a DOE cooperative agreement program, funded by the Savannah River Operations Office through the Center for Risk Excellence. Program initiatives include Toxicology, Environmental Epidemiology and Risk Assessment and Public Policy. The Public Policy initiative includes projects designed to bridge the gap between the science and policy communities, resulting in effective policy based on the best available science. Two such projects are the Lead Education Program and the Teachers' Environmental Education Institute (TEEI). The Lead Education Program is an outreach activity of the Community-Based Environmental Protection (CBEP) program in Charleston and North Charleston, SC. The target population is 1,000 women who are either pregnant or the mothers of young children. Objectives are to increase the awareness of the dangers of lead, teach preventive measures, and stress the importance of testing children for lead. Area residents were trained as lay health advisors, who contacted the target population, offering handouts on lead prevention. Follow-up surveys evaluated the handouts' appropriateness and value. U.S. EPA Region 4, South Carolina's Department of Health and Environmental Control and the EBP funded and sponsored the effort.



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### ***Cultural Impact Analysis and Quality of Life Issues***



Dr. Jennifer L. Smith is a professor of psychology at the University of North Carolina at Charlotte. She has a Ph.D. in psychology from the University of North Carolina at Chapel Hill. Her research interests include the development of social skills in children and adolescents with autism spectrum disorders. She has published numerous articles in the field and is currently working on a book about social skills training for children with autism.

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area. Specifically, she will deal with possible cultural impacts resulting from the presence of contamination and large amounts of waste at cleanup sites, including impacts to traditional practices or transformation of cultural resources. There are also issues that pertain to quality of life and overall satisfaction with the environment. The material she develops this summer will also be useful for her senior thesis that is dealing with environmental problems that traditional (e.g., indigenous) people encounter, which can often prohibit them from fully practicing some of their cultural customs.

## **Ryan Ramos, Argonne National Laboratory**

### ***Integrating Economic Risk in Environmental Assessment***



Widespread contamination at cleanup sites, such as Hanford, can affect ecological and human health, and extensive remediation may be conducted to address those potential risks. However, budget constraints will limit the extent of remediation, which in turn will influence economic activity at a site and in the region, e.g., at Hanford, the Columbia River and surrounding area. A balance between risk reduction and cost needs to be achieved for the benefit of involved parties and stakeholders. In order to strike this balance, a variety of information can be collected to assess economic risk including the identity of the stakeholders, desired use of resources, cost and benefit of remediation alternatives, and the appropriate time frame for effective action. Moreover, emphasis can be placed on public risk perception to assist in clarifying perceived and actual risk. This information can then be cataloged and scenarios developed to assist in management decisions regarding contaminated sites. Obtaining this information and integrating it into a cumulative risk framework presents risk assessors with a considerable challenge. This challenge can be met with an innovative approach involving the development of a risk matrix that takes into account human health, ecological, socio-cultural, and economic risk.

*Ryan Ramos lives in Darien, Illinois, just north of Argonne National Laboratory. He is currently a senior at Northwestern University seeking to complete his Bachelor of Science Degree in Environmental Science and Economics in the fall. He is in the process of writing a thesis on the future of electrical generation and its impact on global warming which he plans to put up for honors review. During his studies at Northwestern he has worked on several projects dealing with Environmental Impact Statements, including the completion of an original EIS on the feasibility of a new electrical generating facility at the former Zion Nuclear Power Plant site. As an intern he plans to apply and enhance my skills involving risk assessment, especially in the field of economics, in order to contribute to the goals of the CRE team. This includes evaluating economic impacts associated with contaminated sites and specific cleanup options, and helping develop a cumulative risk framework that incorporates economic information.*



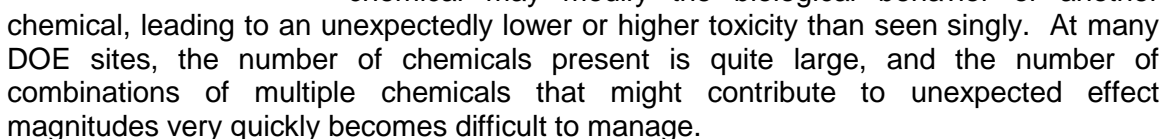
## Human Health/ Ecological Risk Assessment Database



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**Zach Schreiber, Argonne National Laboratory**

## Human Health Screening Approach for Multiple Contaminants



A conceptual framework under development will assist in choosing indicators of potential toxicological interaction. The framework is being used to design a screening method that is currently being tested in a case study by members of the Integrated Risk Team.

*Zach Schreiber lives in Chicago, Illinois. He recently graduated with a Master's degree in Environmental Engineering from Northwestern University, where he also received his Bachelor's of Science in Chemical Engineering in 1998. During his graduate program he wrote a thesis titled Chemical Mixtures Risk Assessment: A Conceptual Model and Reconstructive Toxicology. This summer he will further develop this work, including constructing a screening methodology for multiple contaminants at Department of Energy sites to guide the selective analysis of chemicals that may have interactive toxicity with other contaminants. He will conduct this analysis using a toxicity database and options for presenting toxicity information that he created as a DOE intern over the past year.*

**Roxanne Myshkowec, Argonne National Laboratory**

## Human Health Assessment Case Study

Roxanne's work was a detailed extension of one aspect of the human health risk assessment for chemical mixtures being conducted at Argonne's Environmental Assessment Division (EAD). This involved testing the screening approach being developed. Six chemicals that are key contaminants at many DOE sites were chosen



Dr. Sarah E. Hays is a professor of psychology at the University of North Carolina at Chapel Hill. She is also a senior research advisor at the Center for the Study of Social Design. Her research focuses on the development of social skills in children and adolescents with autism spectrum disorders.

**María V. Reyes-Colón, U.S. Department of Energy, Center for Risk Excellence**

The objective of this project is to determine how science is being translated into technology development. The Environmental Management Science Program was created to identify and fund research that will result in new approaches for solving DOE's environmental problems. The EMSP is a long-term research program designed to bridge the gap between fundamental research and needs-driven applied technology development. Basically, science goes through a number of steps until it reaches the point of completion. The EMSP designed a strategy for research whereby projects are solicited and selected according to scientific merit and program needs of the DOE sites. Research awardees then conduct the research and interface with Focus Areas representatives at different points in the process.

Finally, research is integrated into technology development activities of the Focus Areas and end-users through a number of interactions. Based on the information gathered the following issues were discovered:

- Reporting requirements are not adequate; researchers are only required to report once a year.
- The interaction/integration with Focus Areas is very limited; therefore, the focus of the research project may not be appropriate to the needs of Focus Areas. As a result, Focus Areas do not fund most of these projects.



The focus of this research was to conduct a qualitative review of the issue; interesting results were obtained. A few recommendations are offered to tackle the situation. The communication process between the EMSP and Focus Areas must be improved. This could be accomplished in part by increasing the numbers of status reports and improving the reporting requirements by defining specific performance measures for the scientists to achieve. The conclusion is that science should be translated through constant communication and feedback.

*María V. Reyes-Colón is from Puerto Rico. She is a Chemical Engineering Senior Student with a minor in Environmental Engineering. She goes to school at the University of Puerto Rico Mayagüez Campus. Her hometown is Coamo, a small town in the southern area of the island. In her junior year, she was a Congressional Intern, which was one of the most exciting experiences of her life. María even met the president. In the near future, she will apply to law school in Washington, D.C., her favorite city. María belongs to several student and professional societies, including the Society for Women Engineers, the American Institute of Chemical Engineers and the Society for Women Engineers. For the past 8 years, she has worked part-time as a lifeguard.*

#### **Pedro M. Anglada, U.S. Department of Energy, Center for Risk Excellence**



#### ***Deployment of Phytoremediation at 317/319 Area at Argonne National Laboratory-East***

The objective of analyzing the deployment of Phytoremediation at Argonne National Laboratory-East was to learn more about the different ways this technology works and when and where it could be deployed. Phytoremediation was studied because this technology may be used in Puerto Rico to attenuate

several environmental problems in a pleasing, passive way.

To understand how phytoremediation works, the Internet was searched to identify the different mechanisms that take place in situ to clean up the affected site. Specifics of the Argonne project were then studied for more information about the way that the technology was deployed, how the project has been monitored, the contaminants of concern, and the mechanism for contaminant removal. Phytoremediation was deployed at the 317/319 area of Argonne to remediate soil and groundwater contaminated with Volatile Organic Compounds (VOCs) and Tritium. The specific mechanisms anticipated to clean up the Area are: Phytodegradation, Rhizodegradation, Phytovolatilization and Phytoaccumulation. These four mechanisms will breakdown the contaminants through metabolic processes within the plant, through microbial activity in the root zone, transpiration, and contaminant accumulation in the aboveground portion of the trees. By these four mechanisms, phytoremediation should prove to be a pleasing, passive, solar-energy driven cleanup technique that can be used to remediate several soil and groundwater problems both here and in Puerto Rico.

*Pedro M. Anglada is from Puerto Rico. He is a graduate student from the Interamerican University of Puerto Rico in San German. He has BS in Biology with a minor in Environmental Science. Pedro expects to start his graduate studies in Ecology or in Environmental Science at the University of Puerto Rico at Mayagüez. He's from the town of Barceloneta in the northern region of Puerto Rico. During college, he worked as a volunteer in several laboratories' field projects, helping him to develop his technical skills as a biologist. The last project in which Pedro participated was taking samples of zooplankton at Guayanilla Bay to determine the effect of a thermoelectric plant to the plankton. Another project that he performed was making an aquatic analysis in a determined area of Guanajibo River, considering various water pollutants.*



## **Dan Johnston, Ames Laboratory**

### ***Tradeoffs from DOE Cleanup Actions***

The government often has to decide whether to clean up contaminated sites. One reason given for doing such work is that it is necessary to protect public health and safety. If that is the reason for undertaking such actions, it is essential that they save lives rather than cost lives. This paper offers an analysis of the risk assessed for various options associated with Uranium Mill Tailings Remediation Action (UMTRA) clean up actions. For example, the clean up of the Split Rock, CO site was predicted to prevent 0.003 cancer deaths. The cost for this clean up was \$55 million, which comes to \$18 billion per hypothetical life saved. However, this clean up action required over 700,000 miles of truck driving to move and stabilize the tailings pile and, statistically, this amount



of truck traffic should result in more than 0.003 deaths! Thus, not only did the clean up cost \$55 million; it also cost lives. It is hoped that consideration of such issues will lead to a more complete assessment of the risks involved before such projects are undertaken in the future. The risk assessments of the Uranium Mill Tailings Remediation Action clean ups were evaluated and the accuracy was improved in two ways. First, radiation readings on the pile were more accurately modeled. Second, an improved model was developed to model the dose delivered to different segments of the exposed population. Potential errors in the model were also discussed. This research provided a first taste of the risk assessment process. Risk assessment methods were learned and an appreciation for the complications and the large uncertainty involved in the process was developed.

*Dan Johnston just graduated with a double major in mathematics and physics from Washington University in St Louis. He has returned to his hometown, Ames, Iowa for employment this summer doing statistical analysis of risk. In the fall, he plans to look for a math-related job. After working for a year or two, he hopes to enter graduate school in mathematics.*

## **Laura Sweeney, Ames Laboratory**

### ***Workers: The Forgotten Stakeholders***

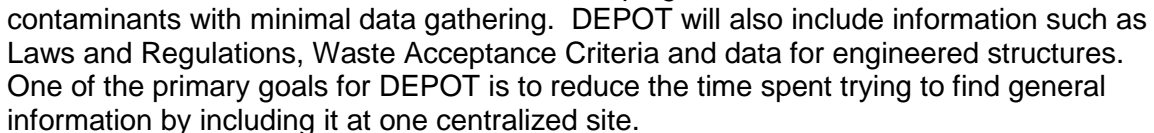
Site remediation involves a tradeoff between risks and benefits to various stakeholders. As such, it is important to ensure that all effected parties are included in the decision making process, and that the process be guided in an ethical manner. The release of contaminated sites may allow for workers to be exposed to significant risks during site remediation. This study-in-progress investigates the hypothesis that workers are compensated according to the risk they voluntarily and knowingly accept. Exploratory in nature, the study has been constructed using data collected on site at Rocky Flats Environmental Technology Site, and in the communities surrounding the site. Participant observation has been favored as the primary data collection method. A number of case studies provide proxy insight to help narrate the perception and background of the current worker situation. Activists, media, community members, scholars, workers, and staff have been interviewed. Future work will concentrate on the collection and analysis of more extensive worker data. The goal is to find trends and indications that might help





*Laura Sweeney is an Iowa State University (ISU) student working on a graduate degree in public administration. She has an interest in international affairs and has worked as a student program assistant at the ISU International Institute of Theoretical and Applied Physics funded by UNESCO. She also does cross-cultural life span research for the ISU Department of Human Development. Her interest in diversity and cultural issues has taken her to such places as Mexico, Guatemala, and Nicaragua. In the future, she plans to continue her travel adventures, the most immediate being a trip to Rocky Flats, Colorado for her CRE internship.*

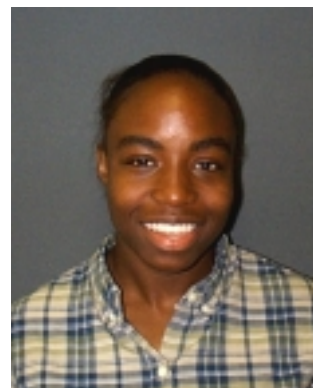
## The Database of Environmental Parameters, Organizations and Tools



**Arista Slate, Argonne National Laboratory**

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*Arista Slate was born and raised on the South Side of Chicago. During the Fall of 2000 she will be a senior at South Shore Community Academy, also on the South Side of Chicago. Her G.P.A. is a stable 4.0, and she ranks 3<sup>rd</sup> in her class with honors. In May 2000, she was inducted into the National Honors Society. June 2000 saw her awarded MVP of the school track team, when she also received an award from the school volleyball team. She plans to go to college, but hasn't yet decided on any particular school. She is an intern at Argonne National Laboratory looking for experience. She feels she needs to experience different career fields before she plans a specific career. As an intern at Argonne National Laboratory she has learned how to set up and design a web page. With this new knowledge she is producing a web page explaining what interns do and how Argonne has helped interns in their future studies. She will also be helping with the web site for the Center for Risk Excellence.*



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**CRE INTERNS 2000**

| Name                  | Mentor                 | Organization   |
|-----------------------|------------------------|--|
| Robert Redsteer       | Dr. Robert Stenner     | Pacific Northwest National Laboratory                      |
| Pete Tano             | Dr. Robert Stenner     | Pacific Northwest National Laboratory                      |
| Noa Dettweiler        | Mervyn Tano, Esq.      | International Institute for Indigenous Resource Management |
| Larry Lapachin        | Mervyn Tano, Esq.      | International Institute for Indigenous Resource Management |
| P. Zachary Thunemann  | Dr. Regina Hunter      | Sandia National Laboratory                                 |
| Ryan Ramos            | Dr. Margaret MacDonell | Argonne National Laboratory                                |
| Margaret Shanafield   | Dr. Margaret MacDonell | Argonne National Laboratory                                |
| Molly Martin          | Dr. Margaret MacDonell | Argonne National Laboratory                                |
| Roxanne Myshkowec     | Dr. Margaret MacDonell | Argonne National Laboratory                                |
| Zach Schreiber        | Dr. Margaret MacDonell | Argonne National Laboratory                                |
| Arista Slate          | Dr. Loren Habegger     | Argonne National Laboratory                                |
| Stephanie Lynne Brown | Dr. Lawrence Mohr      | Medical University of South Carolina                       |
| Maria Reyes-Colon     | Dr. Alvin Young        | DOE Center for Risk Excellence                             |
| Pedro Anglada         | Dr. Alvin Young        | DOE Center for Risk Excellence                             |
| Dan Johnston          | Dr. Martin Edelson     | Ames Laboratory  |
| Laura Sweeney         | Dr. Martin Edelson     | Ames Laboratory  |

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31 July, 00  
Dr. Alvin Young,  
Director, Center for Risk Excellence  
U.S. Department of Energy

Dear Al,

Thank you, for inviting me to the Summer 2000 Intern Program Review last week. I also wish to thank you and the Center's sponsors for making an Intern available to work with me compiling databases from which we can reassess the UMTRA Program from a risk point of view and evaluate lessons learned. The field trip that Dan Johnston joined me on in early July was a eye opener in terms of the amount of pertinent information that is available to be evaluated and learned from the UMTRA experience. If we can mine the information and get it presented correctly it should be very valuable to EM in terms of lessons learned, a.k.a. how not to do it next time.

I thought the Intern Program Review was especially interesting. I was encouraged to see the caliber and capability of the young people available, albeit most are already college graduates. I was also amazed and encouraged at how fast these young scientists were able to assimilate their tasks and subject/topic background and go to work. Much if not all of their work will be useful to the Center and DOE. The only downside to the summer program is that they can't stay to continue working on many of the projects they have initiated and/or in which they have participated. I thought the individual presentations were well done. It was obvious that all had spent considerable time preparing for the Program Review. The view graphs and handouts were a plus in helping me understand what they were trying to convey. It is obvious that their skills with graphics are coming from their institutional training. I was particularly struck with the information presented by Laura Sweeney in her talk, "Workers: The Forgotten Stakeholders". I also thought the presenters discussing the difficult subject, Quality of Life, and Taxonomy of Community Risk had not only useful information, but showed allot of maturity in thinking through this very difficult subject. Each of the Interns actually had useful information in their presentation; it wasn't hard to tell that they were just not killing a summer, but were really trying to make a contribution. In some cases the subjects are very complex and difficult. It is unfortunate that DOE & contractors can't find the means to keep them working. They would bring a breath of fresh air to the workplace.

Again, thanks for the invitation. If DOE/EM et al., can continue to find the funding for these types of programs it will go a long way to assist DOE in attracting capable young college graduates to apply for DOE jobs.

Sincerely yours,

Bruce W. Church



Left to right: Ryan Ramos; Noa Dettweiler; P. Zachary Thunemann; Larry Lapachin; Margaret Shanafield; Molly Martin; Pete Tano; Stephanie Lynne Brown; Robert Redsteer; Maria Reyes-Colon; Dan Johnston; Laura Sweeney; Pedro Anglada; Roxanne Myshkowec; Zach Schreiber; Arista Slate (not pictured).

**The Center would like to thank all of the people who made the summer 2000 CRE internship program possible. We would especially like to thank our Headquarters sponsors, Mr. Randy Scott and Dr. Robert Goldsmith, for helping to fund the program and Dr. Harvey Drucker, our Argonne Co-sponsor. We would also like to thank all of the sponsors, hosts, and mentors who participated in the program including; Margaret MacDonell, Loren Habegger, Bruce Church, William Andrews, Robert Stenner, Mervyn Tano, Regina Hunter, Martin Edelson, Lawrence Mohr, Anibal Taboas, and Yvette Collazo.**